

# The illusion of nonmediation in telecommunication: Voice intensity biases distance judgments to a communication partner<sup>☆</sup>



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## ABSTRACT

The illusion of nonmediation is an experience in mediated communication where individuals respond as if the medium is not there. It is frequently associated with advanced media technology, such as virtual environments and teleconference systems. In this paper, we investigate whether people experience an illusion of nonmediation during interactions as simple as making a phone call. In three experiments, participants were asked to listen to someone's voice on a mobile phone (Experiment 1) or through VoIP software (Experiment 2 and 3) before guessing the location of the person and indicating this location on a map. Results consistently demonstrated that louder voices were judged to be closer, as if the technical mediation was ignored. Combining the three experiments, a small-scale meta-analysis yielded an effect size estimate of  $d = 0.37$  for the 'louder-as-closer' effect. Implications of the results and suggestions for future research are discussed.

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In the opening statement of his landmark paper “The computer for the 21st century”, Mark Weiser stated that “The most profound technologies are those that disappear. They weave themselves into the fabric of everyday life until they become indistinguishable from it” (Weiser, 1991, p. 94). With the rapid development of mobile phones and voice over internet protocols, telecommunication has become one of the most profound technologies in today's society (Cairncross, 1997). Has telecommunication technology become so profound that it disappears psychologically? In media psychology, the phenomenon that people do not fully acknowledge the role of technology in mediated experiences is known as *presence*, defined as the perceptual illusion of nonmediation (Lombard & Ditton, 1997; for more recent overviews, see IJsselsteijn, de Ridder, Freeman, & Avons, 2000; Lee, 2004). While research efforts in this field have primarily focused on multisensory, immersive and interactive media technologies (e.g., virtual environments, high-end videoconferencing, and tele-operation systems), we wondered whether the illusion also applies to the less immersive media that are used daily, such as a mobile phone. Building on the idea that the frequent use of a technology enhances its cognitive

transparency, making it “disappear”, we explore the possibility that people irrationally use the “louder as closer” cue from unmediated communication to judge distance in telecommunication.

In research with advanced presentation media, presence is usually conceptualized as a subjective experience, which can be expressed through certain bodily and behavioral responses (IJsselsteijn et al., 2000). Presence is said to occur either when people self-report their illusions (Heeter, 1995; Slater & Usoh, 1993) or when their responses to mediated stimuli are identical to the responses they would have to similar unmediated stimuli (Heeter, 1995; IJsselsteijn, 2004; Lombard, Reich, Grabe, Campanella, & Ditton, 1995; Reeves & Nass, 1996). In the case of everyday telecommunication, people are not likely to explicitly report that they feel they share the same space with their communication partners. Even so, more subtle effects of presence, such as applying certain cognitive rules of face-to-face communication in mediated communication, might occur (cf. Reeves & Nass, 1996).

One such a rule is the association between someone's voice intensity and spatial location. Because sound intensity decreases with increasing spatial distance in a predictable manner in the real world, people use intensity as the primary auditory distance cue (Zahorik, Brungart, & Bronkhorst, 2005). Many studies have shown that the association is well learned, as people are able to match different levels of sound intensity to corresponding distances (e.g., Petersen, 1990; Stevens & Guirao, 1962). In telecommunication a person's voice intensity offers no valid

<sup>☆</sup> Experiment materials and raw data are available from the Open Science Framework: <https://osf.io/g9ydz/>.

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information about the distance to his or her location due to the technological mediation. For example, during a phone call, the voice of someone from another country can be as loud as the voice of a person calling from next door. Despite that people should know this fact rationally, we hypothesized that people would erroneously consider a louder voice as a cue that their interaction partner is closer when they are uncertain about the true location of the interaction partner, because of the illusion of nonmediation.

As with other media, if presence does occur in everyday telecommunication, its strength should also vary together with many personal and situational factors (for a summary, see Lombard & Ditton, 1997). Here we focused on use experience as a factor, as the widespread use of telecommunication is the most important reason why it might disappear psychologically (cf. Weiser, 1991). In line with this reasoning, increased interaction experience would thus lead to greater interface transparency and a stronger illusion of nonmediation. On the other hand, Lombard and Ditton (1997) have argued that increasing familiarity with a technology could hinder presence because people gradually adapt and gain more technical knowledge, thus allowing them to have a deeper appreciation of the properties of the mediating technology. In addition to examining the “louder as closer” effect in three experiments, we explored whether interaction experience with the technology moderated this effect. In Experiment 1, we tested the “louder as closer” effect with a mobile phone. In Experiment 2, we replicated the “louder as closer” effect with voice over IP (VoIP, i.e., Skype), and explored the moderating role of interaction experience. In Experiment 3, we directly replicated Experiment 2 with a larger sample for a confirmatory test of the moderation effect.

## 1. Experiment 1

### 1.1. Method<sup>1</sup>

#### 1.1.1. Participants and design

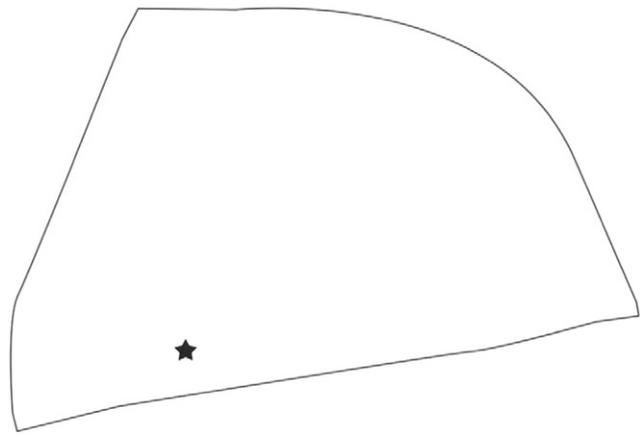
Forty-four people (16 females) voluntarily participated in the experiment. They were randomly assigned to a softer voice condition (41 dB) or a louder voice condition (52 dB).

#### 1.1.2. Procedure

Students passing through the central library at Eindhoven University of Technology (TU/e) were randomly asked to help with an ostensible phone call quality test. Upon agreeing to participate, they were asked to use a mobile phone provided by the experimenter to answer a call from a research assistant who was described as “being somewhere on the campus”. Participants were randomly assigned to the softer or louder voice condition by the research assistant who made the phone calls, ensuring that the experimenter was blind to the conditions. During the 30-second phone call, they listened to a segment of pre-recorded English speech with different volumes manipulated by the assistant. Afterwards, participants were shown an abstracted campus map (see Fig. 1) and were asked to mark the location of the caller on the map based on their intuition. Next, they were asked to answer a 5-item questionnaire concerning perceived loudness, sound quality, processing fluency, liking and familiarity with the speech (all on 7-point scales). Finally, they were debriefed and thanked.

## 1.2. Results and discussion

The data of two participants were excluded based on pre-defined criteria. One participant marked the location of the train station based on the content of the call. The other judged the location as the building of the experimenter's faculty. This left 20 participants in the softer voice condition, and 22 participants in the louder voice condition. The manipulation check confirmed that participants perceived the voice intensity



**Fig. 1.** The abstraction of the TU/e campus map used in the experiments. The figure represents the abstraction of the TU/e campus map used in the experiments. The star marks the central library at TU/e (where the participants were during the experiment) at the time Experiments 1 and 2 were performed (see the experimental materials for the map used in Experiment 3). Participants were asked to mark the location of the research assistant within the range of this map.

in the softer condition as softer ( $M_{\text{softer}} = 2.75$ ,  $SD_{\text{softer}} = 1.12$ ) than in the louder condition ( $M_{\text{louder}} = 4.00$ ,  $SD_{\text{louder}} = 1.38$ ),  $t(40) = 3.21$ ,  $p = .003$ ; Cohen's  $d = 0.99$ . Distance judgments were computed by measuring the Euclidean distance (in centimeters) between participants' marked locations and the library. As expected, participants judged the caller's location to be nearer if they heard a louder compared to a softer voice ( $M_{\text{softer}} = 9.93$ ,  $SD_{\text{softer}} = 3.61$ ;  $M_{\text{louder}} = 7.34$ ,  $SD_{\text{louder}} = 3.77$ ;  $t(40) = 2.27$ ,  $p = .029$ ; Cohen's  $d = 0.70$ , 95% CI [0.07, 1.32]).<sup>2</sup> On the contrary, the intensity manipulation did not result in significant differences on other measured dimensions (quality, fluency, liking and familiarity). The results provide initial support for the “louder as closer” effect.

## 2. Experiment 2

We aimed to replicate the “louder as closer” effect with a different type of telecommunication in Experiment 2. At the time of Experiment 2, in 2012, VoIP (e.g., Skype) was quickly gaining popularity among young people, becoming a cheaper alternative for long-distance calls. Compared with calling using a mobile phone, however, the technological salience of a Skype call (using a notebook and a head-phone) was much higher, which might suspend the illusion of nonmediation (cf. Lombard & Ditton, 1997). Therefore, we chose VoIP to test whether the effect could replicate and generalize the “louder as closer” effect. Another motivation for choosing VoIP was that there were large individual differences in how much experience Dutch students have in using VoIP software. This fact allowed us to explore the moderating role of interaction experience. We expected that the “louder as closer” effect would be stronger with increasing interaction experience people reported to have with VoIP, as this would enhance the cognitive transparency of the technology.

### 2.1. Method

#### 2.1.1. Participants and design

Sixty-seven Dutch students (20 females, mean age 22.3) voluntarily participated in the experiment. They were randomly assigned to a softer voice condition (43 dB) or a louder voice condition (63 dB).<sup>3</sup>

<sup>2</sup> With those two data points included, the “louder as closer” effect was marginal ( $t(42) = 1.82$ ,  $p = .075$ ; Cohen's  $d = 0.55$ , 95% CI [-0.06, 1.15]).

<sup>3</sup> Since we had more control in the VoIP setting, we increased the sound pressure level (SPL) difference to strengthen the manipulation.

<sup>1</sup> Experiment materials and raw data are available from the Open Science Framework: <https://osf.io/g9ydz/>.

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